REARVIEW MIRROR ASSEMBLY

TECHNICAL FIELD

[0001] The present invention relates to a rearview mirror assembly with a bracketless mounting feature for attaching the mirror assembly to a side of a vehicle, and, more particularly, the present invention relates to a rearview mirror assembly with a mounting feature adaptable for various adjustment mechanisms.

BACKGROUND OF THE INVENTION

[0002] Traditional side rearview mirror assemblies are expensive and difficult to assembly in a mass-manufacturing environment. They require a mounting bracket that attaches a housing of the mirror assembly to a side of a motor vehicle. This bracket adds to the overall cost of the mirror assembly. Additionally, the design of the bracket becomes specific to one particular vehicle since it is an exterior trim piece and must cooperate with the overall design scheme of the vehicle. Creating different brackets for different vehicles also adds to the cost of the mirror assembly.

[0003] In addition to the bracket having a specific design for aesthetic reasons, the bracket may also vary in its design to accommodate different mirror adjustment mechanisms. Today, some vehicles use a manual adjustment mechanism with a simple handle extending from the mirror to the interior of the vehicle. Higher priced vehicles include electrically adjustable side rearview mirrors. These higher priced vehicles use additional components to adjust the mirror. Depending upon which adjustment mechanism is desired in the vehicle, a separate mounting bracket would be necessary to accommodate the necessary components of each adjustment mechanism. Again, the need for different brackets adds to the cost of the vehicle.

[0004] Also, the use of a mounting bracket makes the assembly of the mirror to the vehicle difficult and time consuming. An assembly that would eliminate the use of a mounting bracket is highly desired.

[0005] There remains a need in the automotive industry for a side rearview mirror assembly that is inexpensive to manufacture, yet easy to assemble and able to

accommodate a variety of adjustment mechanisms. The present invention, as described below, fulfills each of these needs.

SUMMARY OF THE INVENTION

[0006] The subject invention is a mirror assembly having a mounting surface with an inner and outer side and an opening disposed therebetween. The mirror assembly also includes a case with a reflective mirror disposed with the case. Positioned within the case is a guide mechanism having a first aperture. A connector is positioned between the case and the inner side of the mounting surface and includes a second aperture. Finally, the mirror assembly also includes an adjustment mechanism.

[0007] A further understanding of the present invention will be had in view of the description of the drawings and detailed description of the invention, when viewed in conjunction with the subjoined claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Other advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

[0009] Figure 1 is a perspective view of a motor vehicle with a mirror assembly of the subject invention;

[0010] Figure 2 is an exploded view of the mirror assembly with a handle adjustment mechanism for manual adjustment of a mirror;

[0011] Figure 3 is an exploded view of the mirror assembly with a harness adjustment mechanism for electrical adjustment of the mirror;

[0012] Figure 4A is an outer perspective view of a connector of the mirror assembly;

[0013] Figure 4B is an inner perspective view of the connector of the mirror assembly;

[0014] Figure 5 is a perspective view of an inner side of a mounting surface of the motor vehicle;

[0015] Figure 6 is a perspective view of a guide mechanism of the mirror assembly of the subject invention;

[0016] Figure 7 is a perspective view of the handle adjustment mechanism of the mirror assembly;

[0017] Figure 8 is an inner perspective view of the handle adjustment mechanism extending through the connector and into the inner side of the mounting surface of the motor vehicle;

[0018] Figure 9 is a perspective view of the mirror assembly of the subject invention having a handle adjustment mechanism;

[0019] Figure 10 is a perspective view of the mirror assembly of the subject invention having the harness adjustment mechanism;

[0020] Figure 11 is a perspective view of the mirror assembly of the subject invention having the harness adjustment mechanism and the case moveable; and

[0021] Figure 12 is a perspective view of the case of the mirror assembly.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] Referring to the Figures, wherein like numerals indicate like or corresponding parts throughout the several views, a mirror assembly is generally shown at 10 in FIG. 1. The mirror assembly 10 is shown attached to the side of a motor vehicle generally shown at 12. The subject invention includes a mirror assembly 10 having three distinct embodiments – a handle mirror assembly 10, an electrically actuated mirror assembly 10 and a moving case mirror assembly 10. All three embodiments have the components described herein and shown in Figures 2 and 3.

[0023] The mirror assembly includes a case 14 having a generally rectangular shape and a reflective mirror 16 disposed within said case 14. The shape of the reflective mirror 16 and case 14 of the present invention, however, can be of any shape. The reflective mirror 16 includes a back plate 18 that is connected to an adjustment mechanism 20. The adjustment mechanism 20 has a first end 22 and a second end 24. The first end 22 of the adjustment mechanism 20 is attached to the

back plate 18 of the reflective mirror 16 by conventional means commonly used in the art.

[0024] The case 14 also includes a guide mechanism 26. The guide mechanism 26 has a first aperture 28. With the first end 22 of the adjustment mechanism 20 connected to the back plate 18 of the reflective mirror 16, the second end 24 extends through this first aperture 28 of the guide mechanism 26 to an outer side of the case 14. The guide mechanism 26 also includes wings 30 extending from each side of the first aperture 28. An inner side 32 of the guide mechanism 26 faces the reflective mirror 16 while an outer side 34 faces the motor vehicle. The outer side 34 of the guide mechanism 26 includes a rib 36 and a knob 38. The rib 36 is used to fixedly position the guide mechanism 26 to the case 14 in the handle mirror assembly 10 and electrically actuated mirror assembly 10. The case 14 receives the rib 36 in a slot (not shown) to fixedly position the guide mechanism 26 in the case 14. The knob 38 is used in the third embodiment of the moving case mirror assembly 10. The case 14 in the moving case embodiment includes a plurality of grooves 40. These grooves 40 receive the knob 38 of the guide mechanism 26 as the case 14 rotates about the guide mechanism 26 and the adjustment mechanism 20. Rotating the case 14 permits the mirror assembly 10 to be folded inward against the exterior side of the vehicle 12. Folding the mirror assembly 10 inward reduces the overall width of the vehicle thereby assisting when shipping the vehicle 12 or parking the vehicle 12 in confined spaces.

[0025] In order to attach the case 14 of the mirror assembly 10 to the vehicle 12 a connector 42 is positioned between the case 14 and the vehicle 12. The connector 30 contains a second aperture 44 that also receives the second end 24 of the adjustment mechanism 20. The motor vehicle 12 includes a mounting surface 46 having an inner side 48 and an outer side 50. The mounting surface 46 is positioned on the side of the vehicle 12. The mounting surface 46 includes an opening 52. This opening 52 receives the connector 42 and the second end 24 of the adjustment mechanism 20. The connector 42 also includes a threaded hole 54 for receiving a screw 56. The screw 56 is positioned at the inner side 48 of the mounting surface 46 and threadably engages the threaded hole 54 to fixedly attach the connector 42 to the vehicle 12. To further secure the connector 42 to the vehicle 12, the connector 42

includes at lease one locking knob 58 that engages an extension 60 in the mounting surface 46. The preferred embodiment illustrates the use of two locking knobs 58 that engage two extensions 60 in the mounting surface 46, however, only one locking knob 58 is required. The locking knob 58 requires that the connector 42 be properly oriented for insertion through the opening 52 of the mounting surface 46. Once inserted through the opening 52, the connector 42 is rotated and then secured to the vehicle 12. In addition to the screw 56, the connector 42 also includes a lip 62 having a locking boss 64. The locking boss 64 is received in a locking embossment 66 on the outer side 50 of the mounting surface 46. Therefore, to properly connect the mirror assembly 10 to the vehicle 12, the connector 42 is orientated to be inserted through the opening 52 of the mounting surface 46 by passing the locking knob 58 through the extension 60 in the mounting surface 46. Once properly inserted, the connector 42 is rotated and the locking boss 64 is received in the locking embossment 66. The lip 62 is positioned flat against the outer side 50 of the mounting surface 46. Finally, the screw 58 is threadably engaged with the threaded hole 54 of the connector 42.

[0026] The adjustment mechanism 20 in all three embodiments extends through the first aperture 28 of the guide mechanism 26, the second aperture 44 of the connector 42 and the opening 52 in the mounting surface 46. Accordingly, the second end 24 of the adjustment mechanism 20 is positioned on the inner side 48 of the mounting surface 46 and thereby inside the vehicle 12 and accessible to an operator.

[0027] In the first embodiment, the handle mirror assembly 10, the adjustment mechanism 20 is a handle 68. The handle 68 has a generally tubular shape with and angled extension 70 at the second end 24. The angled extension 70 begins when then handle 68 reaches the inner side 48 of the mounting surface 46. The extension 70 angles toward the operator of the vehicle 12 for manual adjustment of the reflective surface 18. The handle 68 also includes a locking mechanism 72 positioned at the inner side 48 of the mounting surface 46. The locking mechanism 72 is used to limit the vertical adjustment of the reflective surface 18. The locking mechanism 72 is shown as a rectangular extension on the handle 68. The locking mechanism 72 interferes with the connector 42 when moved to maximum upper or lower positions. The interference prevents any further vertical adjustment of the reflective surface 18.

The width of the second aperture 44 of the connector 42 limits the horizontal adjustment of the reflective surface 18 in the case 14. The horizontal stroke of the handle 68 is limited when the handle 68 contacts a side surface of the second aperture 44 of the connector 42. To position the handle 68 within the case 14 the adjustment mechanism 20 includes a lip 74. Positioned between the lip 74 and the inner side 32 of the guide mechanism 26 is a biasing device 76. The biasing device 76, most commonly a spring, urges the guide mechanism 26 against the case 14 and the locking mechanism 72 of the handle 68 against the connector 42, thereby properly positioning the components of the mirror assembly 10. Furthermore, the portion of the handle 68 positioned in the first aperture 28 of the guide mechanism 26 has a flattened surface 78 on one side of the tubular handle 68. This flattened surface 78 mates against a plane 80 within the first aperture 28 of the guide mechanism 26. The mating of the flattened surface 78 and the plane 80 prevents rotation of the handle 68 within the mirror assembly 10. Again, this ensures that the components of the mirror assembly 10 are properly positioned.

[0028] In the second embodiment, the electrically actuated mirror assembly 10, the adjustment mechanism 20 includes an electric motor 82 and a harness 84. The electric motor 82 is positioned within the case 14 and is connected to the back plate 18 of the reflective mirror 16. The electric motor 82 actuates movement of the back plate 18 and reflective mirror 16 within the case 14. The electric motor 82 receives power and control signals through electrical controls 86. The electrical controls 86 are connected to the electric motor 82 and extend to inside the vehicle 12. The controls 86 are contained within the harness 86. The harness 84 encapsulates the electronic controls 86 and extends from the electric motor 82 to the inside of the vehicle 12. The harness 84, typically made of plastic, also includes a plurality of strengthening ribs. Similarly configured like the handle 68, the harness 82 also includes a lip 74 and a flattened surface 78. A biasing device 76 is positioned between the lip 74 and the inner side 32 of the guide mechanism 26. As with the handle 68, the flattened surface 78 mates against the plane 80 in the first aperture 28 of the guide mechanism 26 to prevent rotation. The electronic controls 86 extend through the harness 84 and into the vehicle 12. The vehicle 12 will include a control mechanism (not shown) in which the

operator commands movement of the reflective mirror 16 within the case 14 and a signal is sent through the electrical controls 86 and received by the electric motor 82.

[0029] The final embodiment, the moving case mirror assembly 10, only uses the adjustment mechanism 20 to properly position the components of the mirror assembly 10. This embodiment only includes the harness 84. The harness 84 is positioned as in the electrically actuated mirror assembly 10. The biasing device 76 is positioned between the lip 74 and the inner side 32 of the guide mechanism 26 to properly position the components of the assembly 10. The harness 84 is left hollow. A plug (not shown) conceals the second end 24 of the harness 84 positioned inside the vehicle 12. The plug is strictly provided for aesthetic purposes. The mirror assembly 10 is adjusted by moving the case 14 about the guide mechanism 26. The knob 38 positioned on the outer side 34 of the guide mechanism 26 is received in one of a plurality of grooves 40 in the case 14. The operator manually adjusts the mirror assembly 10. There are no control mechanisms or handles. At a maximum position, the mirror assembly 10 is flat against the side of the vehicle 12.

[0030] All three embodiments utilize the same components, thereby reducing the manufacturing costs for producing the vehicle 12. All assemblies 10 use the same case 14, guide mechanism 26 and connector 42. The only component that varies is the type of adjustment mechanism 20 – either the handle 68, electric motor 82 with harness 84 or the harness 84 alone. The simplicity of alternating the adjustment mechanism 20 to accommodate various options with each vehicle 12 reduces the overall production costs and assembly efforts.

[0031] Those skilled in the art can now appreciate from the foregoing description that the broad teachings of the present invention can be implemented in a variety of forms. Therefore, while this invention has been described in connection with particular examples thereof, the true scope of the invention should not be so limited, since other modifications will become apparent to the skilled practitioner upon a study of the drawings, specification and following claims.